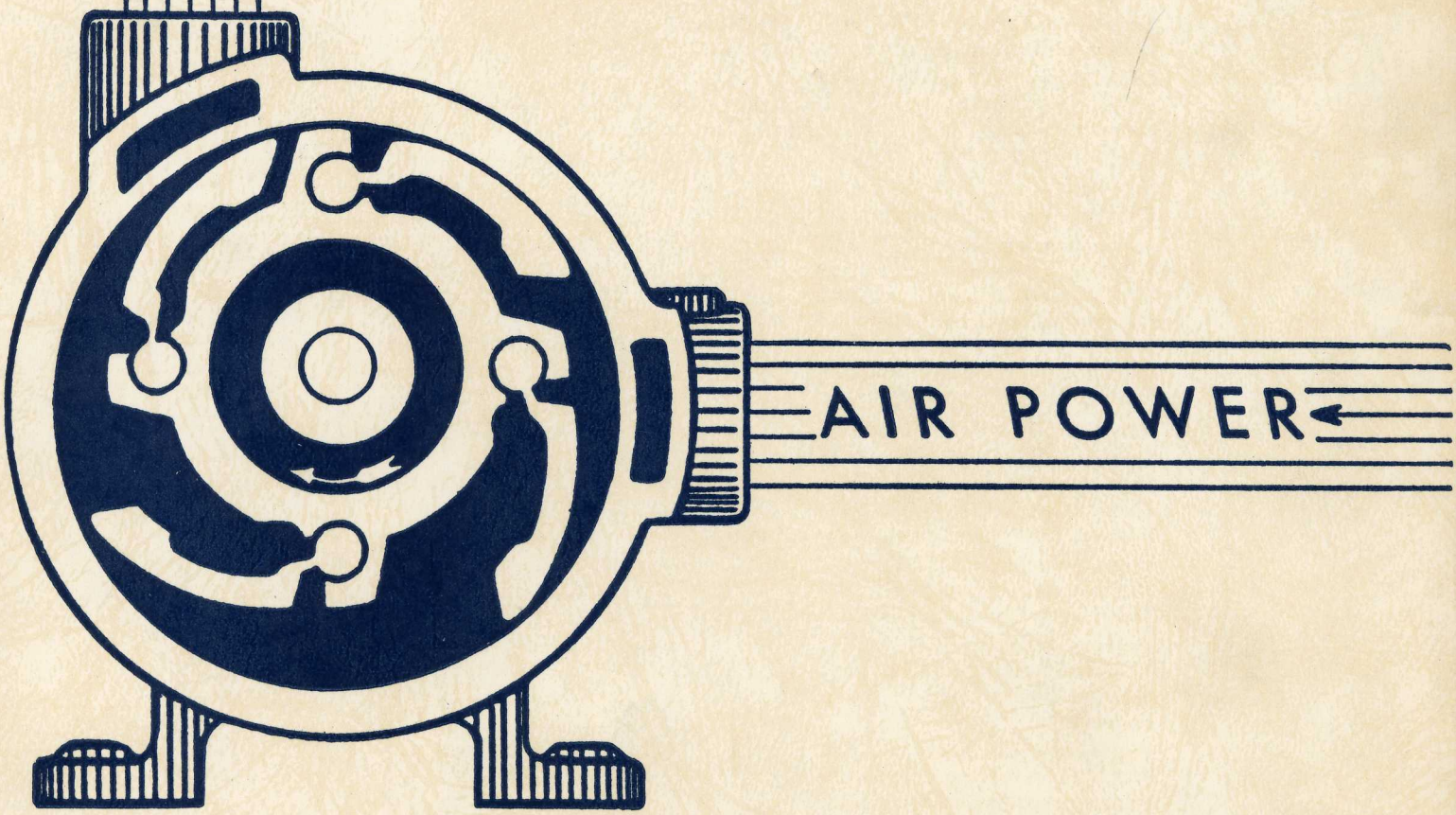
BULLETIN 7359

LEIMAN AIR PUMPS

TYPICAL APPLICATIONS



LEIMAN BROS • INC • NEWARK 5, N. J.

APPLICATIONS

1-A

MEANING OF TERMS

PUMP DISPLACEMENT. This is the actual volume of air moved inside a pump. It is the volume of air which will pass through a pump if it goes through in a free state, that is, under atmospheric pressure.

The pump displacement remains constant under vacuum or pressure conditions. Under pressure the delivered volume of air is less than the displacement because the air is compressed to a smaller volume when leaving the pump. Under vacuum the space inside the pump is filled with expanded air and when the air is exhausted to the atmosphere it shrinks back to atmospheric pressure and has a smaller volume.

PUMP CAPACITY. This is the actual volume of air exhausted by the pump when the pump is operated under load. It is the displacement less the slippage or internal losses and is usually given in cubic feet of free air per minute.

FREE AIR is air under atmospheric pressure, which pressure is about 14.7 pounds per square inch at sea level.

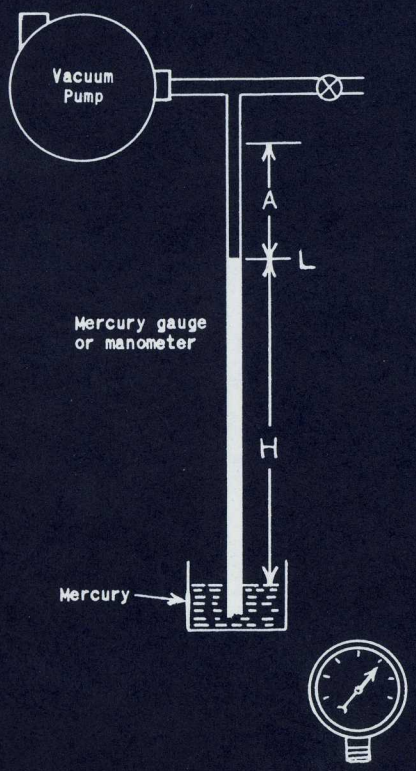
EXPANDED AIR is air which is under a partial vacuum.

COMPRESSED AIR is air which is under a pressure above the atmospheric pressure.

ABSOLUTE PRESSURE is the pressure measured above an absolute zero, which exists in a chamber from which all air has been removed. The atmosphere is under about 14.7 lbs. absolute pressure when measured at sea level. Above atmospheric pressure, the absolute pressure is the sum of the gauge pressure and the atmospheric pressure.

C.F.M. = Cubic feet per minute.
Hg. = Mercury
1 inch mercury gauge = 13.6 inches water gauge.
Manometer - A gauge for measuring pressure or vacuum.
Barometer - A gauge for measuring the pressure of the atmosphere.
Pitot tube - A gauge for measuring the velocity flow of air in a duct.

1-B



WHAT IS VACUUM?

A vacuum is a space devoid of matter. It is almost impossible to obtain a perfect vacuum but a good pump will pump close to it.

The degree of vacuum is usually measured with a mercury gauge or manometer consisting of a glass tube open at both ends. one end of which is submerged in a pool of mercury, and the upper end connected to the system being evacuated. See sketch. It can be seen that the pressure of the surrounding atmosphere is exerted only on the free surface of the mercury in the pool,while the low pressure in the system being evacuated is exerted only on top of the column of mercury in the tube. The difference in pressure between the atmosphere and the evacuated system causes the mercury column to rise and the degree of vacuum is the number of inches measured from the top of the mercury pool to the top of the column.

The atmospheric pressure varies from time to time but it is usually about 14.7 lbs.per sq.in. when measured at sea level. This corresponds to a barometric pressure of 30.00 inches mercury column.

ABSOLUTE PRESSURE. The degree of vacuum referred to above must not be confused with Absolute Pressure which is that existing in the partially evacuated system in the tube above the mercury level "L" (see "A") This is gotten by difference,namely:

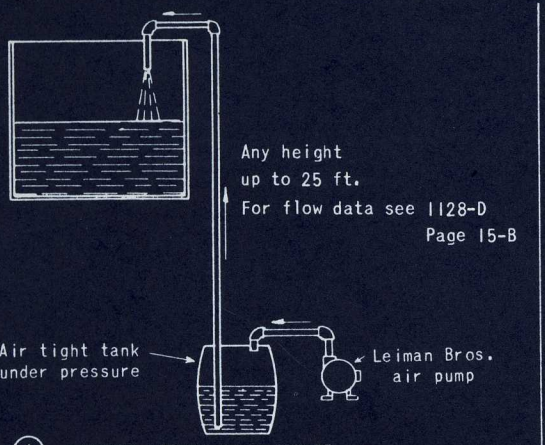
Absolute pressure = Atmospheric press. - Degree of vacuum

To convert inches mercury to pounds pressure:
2.04 inches mercury = 1 pound per sq.in.

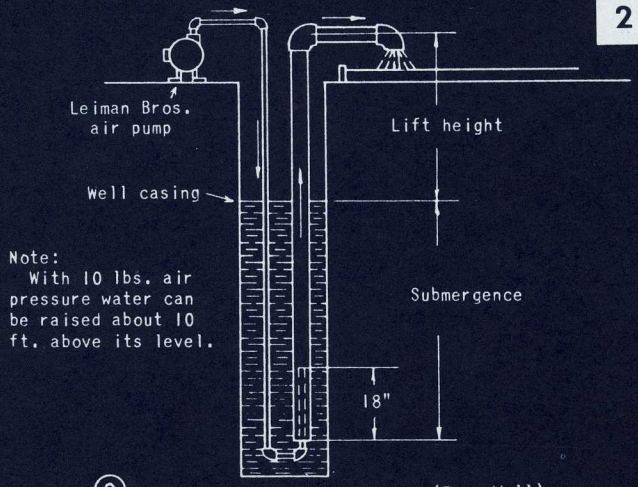
For most practical purposes a clock type vacuum gauge is generally used.

LIFTING LIQUIDS BY AIR

2-A

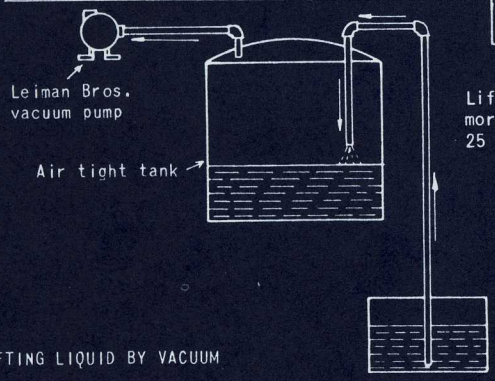


① LIFTING LIQUID BY PRESSURE



Note:
With 10 lbs. air pressure water can be raised about 10 ft. above its level.

③ LIFTING LIQUID BY PRESSURE (From Well).



Lift cannot be more than about 25 feet

② LIFTING LIQUID BY VACUUM

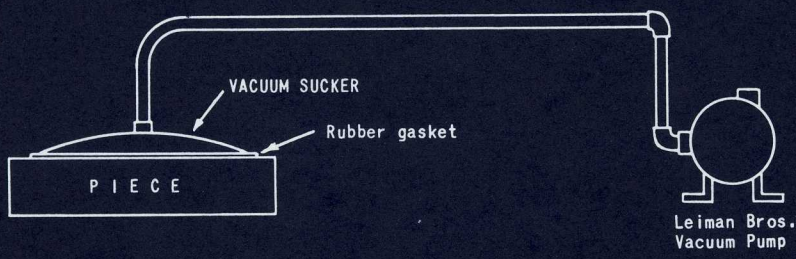
For flow data see 1128-F Page 4B and 1128-D Page 5B

① Example: A size B pump at 5 pounds pressure will cause a flow of 50 gal. of water per minute up thru a $1\frac{1}{2}$" pipe if height is 9 feet.

1128-A

LIFTING PIECES BY VACUUM

2-B



This method is necessary on heavy pieces which cannot be lifted by eye bolts or slings. It is also applied to large, very flexible sheets in which case a number of suckers are used.

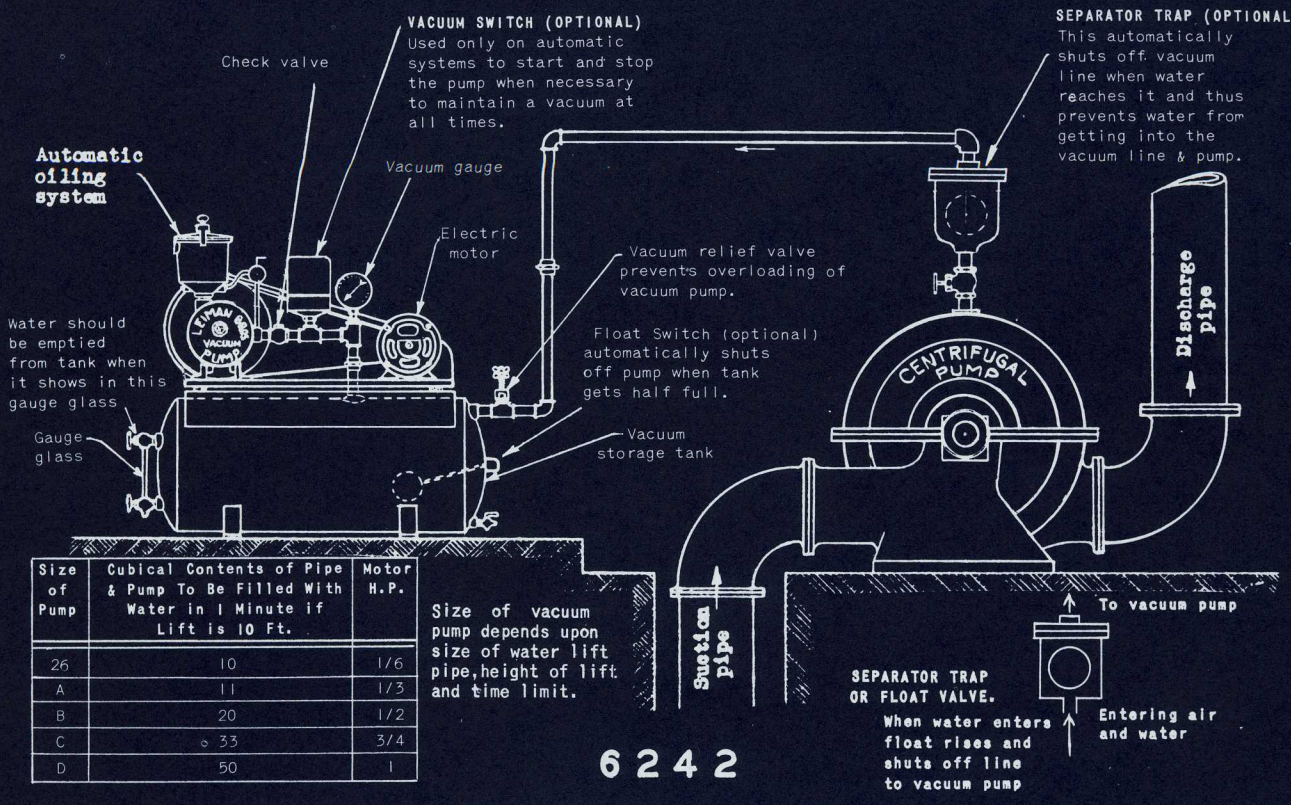
Working with 20" Hg. vacuum, each square inch of sucker area will lift 10 pounds and a sucker having an area of 60 square inches will lift 600 pounds.

SIZE OF PUMP	MAX. VAC.	APPROX. MAX. WEIGHT OF PIECE	APPROX. MAX. DIA OF SUCKER
26	20"	100 LBS.	4"
B		450 LBS.	8"
C		1000 LBS.	12"
28-3	29"	600 LBS.	8"
29-3		1400 LBS.	12"
29-6		3000 LBS.	18"

6295

3-A

WATER PUMP PRIMING SYSTEM



Size of Pump	Cubical Contents of Pipe & Pump To Be Filled With Water in 1 Minute if Lift is 10 Ft.	Motor H.P.
26	10	1/6
A	11	1/3
B	20	1/2
C	33	3/4
D	50	1

6242

3-B

WATER PUMP PRIMING PROCEDURE

Referring to the drawing 6242, when starting this vacuum pumping system, the air valve on top of the centrifugal water pump should first be closed. The vacuum pump unit should then be started. When the vacuum in the reservoir tank has reached a predetermined amount (say 20") the vacuum switch will automatically stop the motor. This vacuum switch will automatically start the motor again when the vacuum has dropped to a set amount (say 18") and thus a high vacuum is automatically held on the tank at all times. The vacuum relief valve is only for emergency purposes and should be set so that it will not open until the vacuum has reached a higher point than that which the vacuum switch is set for.

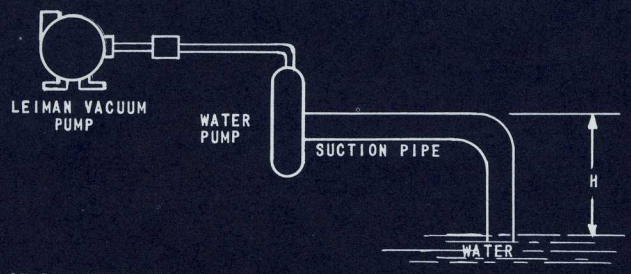
The centrifugal water pump can now be started running and the air valve on top of the water pump can be opened. A check valve should be installed in the water pump discharge line to prevent air leaking back from this point. The water in the suction line will then gradually rise until it has filled the water pump. After the water pump has become partly filled, the water will continue to flow and the vacuum will no longer be needed. The air valve on top of the water pump can then be shut off.

The separator trap on top of the water pump prevents any water getting into the vacuum line, in case the hand shut-off air valve is not shut off soon enough. When water gets into this trap, it simply causes the float to rise and shut off the air line.

6242-A

WATER PUMP PRIMING CALCULATIONS

4-A



VALUES OF F FOR FORMULA

H in FT.	SIZES OF PUMPS 26-1½ A	B	C	D	INCHES Hg. VAC REQ.
5	.33	.25	.13	.07	.04	5
10	.40	.30	.15	.08	.05	9
15	.48	.36	.18	.10	.06	13
20	.56	.42	.21	.12	.08	18
AIR PUMP R.P.M.	1750	600	600	400	300	

PIPE SIZE	VOLUME IN CU.FT. PER LINEAR FOOT PIPE
2"	.023
3"	.051
4"	.088
6"	.201
8"	.355
10"	.566
12"	.797
15"	1.107

Let C equal the cubical contents of the pipe and water pump in cubic feet.

Then: Time to prime pump = FxC (in minutes)

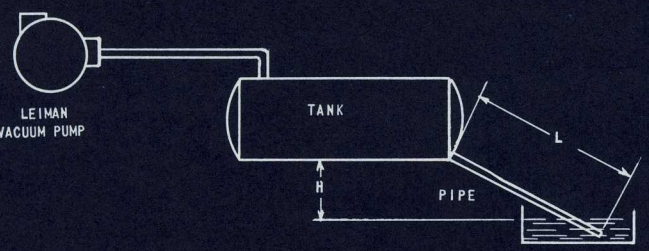
Example: If a water pump and suction pipe have cubical contents of 16 cubic feet and the lift height is 10 ft. and it is planned to use a size "A" vacuum pump then the value of F is .30. Then 16 times .30 equals 4.8 minutes to do the priming.

These figures are approximate only and are based on water pipe being larger in diameter in proportion to the length. Resistance due to fluid friction has been neglected.

6242-E

VACUUM REQUIRED TO CAUSE WATER TO FLOW UP INTO TANK

4-B



		IF H=0 L=25 FT.				IF H=0 L=12½ FT.				IF H=9FT L=12½ FT.			
CFM	GAL.	3/4	1"	1½"	2"	3/4	1"	1½"	2"	3/4	1"	1½"	2"
.7	0 5	2.3	.7			1.2	.4			8. 9.2	8. 8.4	8.	8.
1.3	10	8.5	2.5	.3		4.3	1.3	.2		12.3	9.3	8.2	
2.	15	18	5.6	.7		9.	2.8	.4		17.	10.3	8.4	
2.7	20		9.	1.2	.3	15	4.5	.6	.2	23.	12.5	8.6	8.2
4.	30		18	2.5	.8		9.	1.3	.4		17.	9.3	8.4
5.3	40			4.2	1.5		22	2.1	.8			10.1	8.8
6.7	50			6.3	2.2			3.2	1.1			11.2	9.1

PIPE SIZE

INCHES OF MERCURY

An air pump with 5.3 cfm. will not cause a flow of 40 gal. per min. of water until vacuum reaches value given in table.

The flow depends upon the vacuum in the tank. Time required to obtain the vacuum depends upon the size of the pump and the tank.

The flow depends upon the size of pump and tank, length and size of pipe, and the height of lift.

The larger the pump the faster the flow.
The larger the pipe the faster the flow.
The larger the tank the slower the flow.
The greater the height the slower the flow.

In the table above "Gal" is the gallons of water that will flow per minute.
" " " " "Cfm" is the equivalent volume of air.

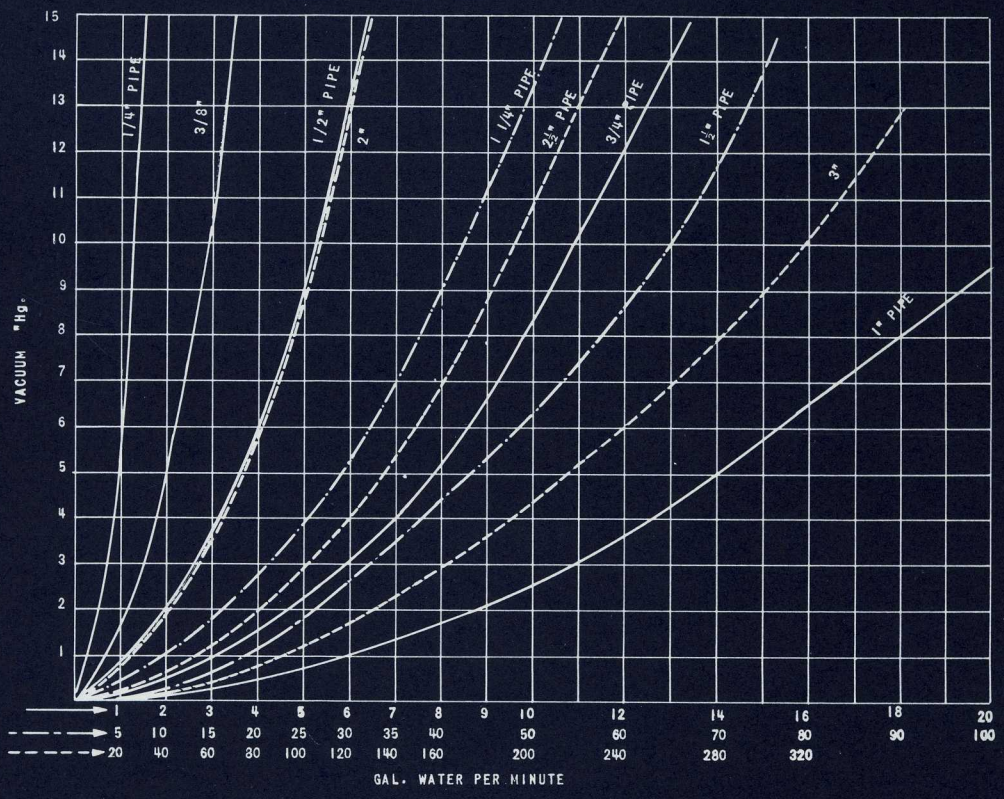
Total vacuum required is the vacuum necessary to raise the water to the tank plus the vacuum required to cause flow. Vacuum to raise water $\frac{H \text{ in ft.}}{1.13}$

Vacuum to cause flow is given in above table. This vacuum is in direct proportion to length of pipe.

1128-F

5-A

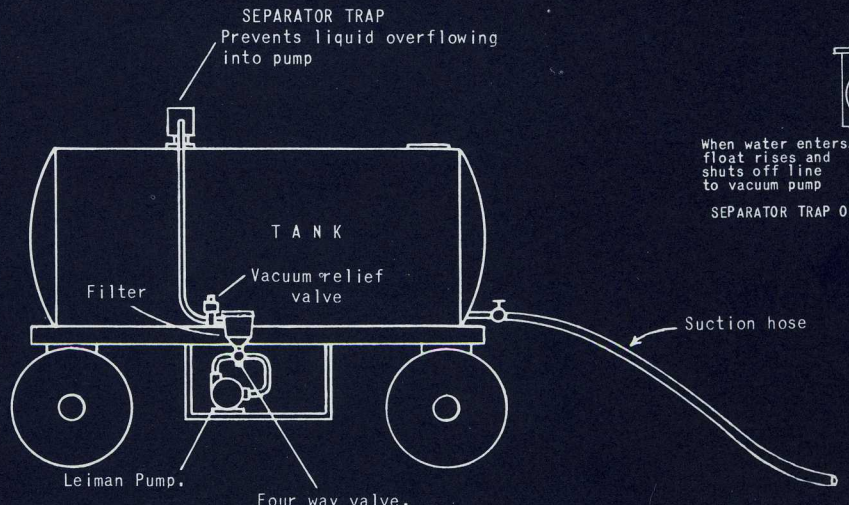
FLOW OF WATER THRU PIPES 25 FT. LONG

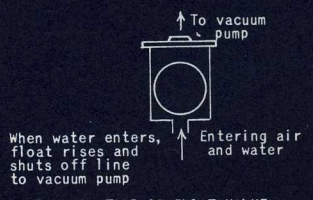


6191-G-1

5-B

TRANSFERRING LIQUIDS AND CHEMICALS





SEPARATOR TRAP OR FLOAT VALVE.

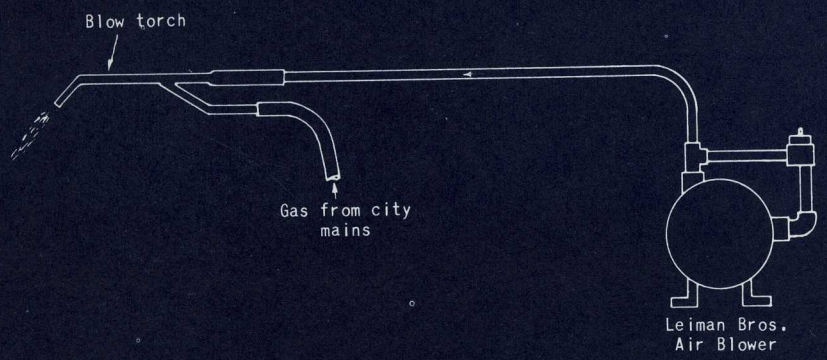
The larger the pump, the faster the flow.
The " " hose, " " " "
The " " tank, " slower " "
The longer " pipe, " " " "
The greater " height, " " " "

For more data see sheet 1128-A

1128-D

AIR FOR BLOW TORCHES

6-A



NO. OF TORCHES

Size Pump	3/8" Size	1/2" Size	Motor H.P.
A	6	2	1/4
B	10	4	1/3
C	16	6	1/2
D	28	10	3/4
E	68	24	1-1/2

Mixture - One part gas to seven parts air.

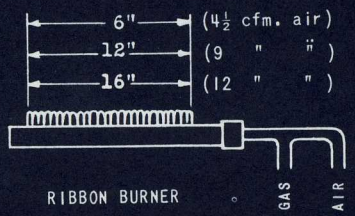
About 1 to 2 lbs. air pressure required.

When the proportioning of gas to air is very important it is necessary to use a gas booster pump with a sensitive pressure regulator valve to overcome the fluctuations in the city gas pressure.

6104

GLASS BLOWING

6-B

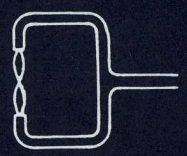


BLOW TORCH

FLAME Dia.	Length	C.F.M.
1/4"	4"	1/4
3/8"	4	1/2
1/2"	4	1-1/6
3/4	6	2
1-1/4"	9"	6-1/2

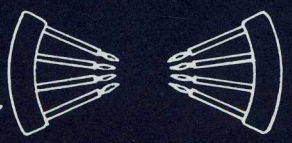
SIZE OF PUMP REQUIRED FOR SHOP

No. of Men	Size of Air Blower	Size of Gas Pump
1	#B	#26
2	C	#A
3	D	B
7 or 8	E	C



SEALING OR TIPPING TORCH
1/4 cfm. air

Flame length	CFM. per burner
2½"	1/10
3¾"	1/8
5¼"	3/16



CROSS FIRES

Leiman Bros. Pump

Air at about 2 to 4 pounds pressure is supplied to mix with the gas. Each cubic foot of gas requires about 5 to 7 cubic feet of air.

When the proportioning of gas to air is very important, it is necessary to use a gas booster pump with a sensitive pressure regulator valve to overcome the fluctuations in the city gas pressure.

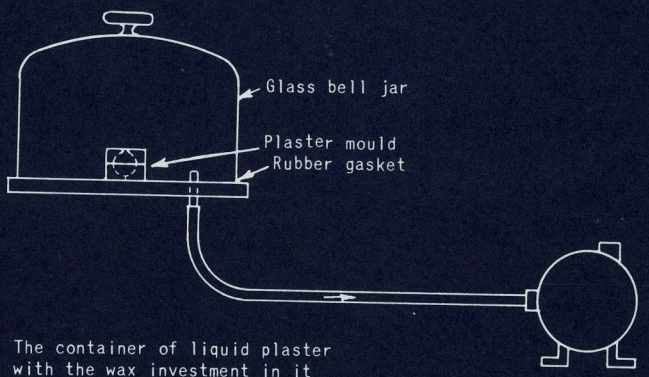
For evacuating tubes preparatory to filling with Neon gas, a super-high vacuum pump is required as a nearly perfect vacuum is necessary. A final vacuum of about .002 mm. is obtained with a mercury aspirator pump.

" One cu.ft. of air is required for each 100 BTU. per cu.ft. of mfd. gas."

6138

EXTRACTING AIR FROM MATERIALS BY VACUUM

7-A



The container of liquid plaster with the wax investment in it is placed in the bell jar and the vacuum turned on before it sets. The vacuum extracts all air bubbles from the plaster.

Leiman Bros. Vacuum Pump

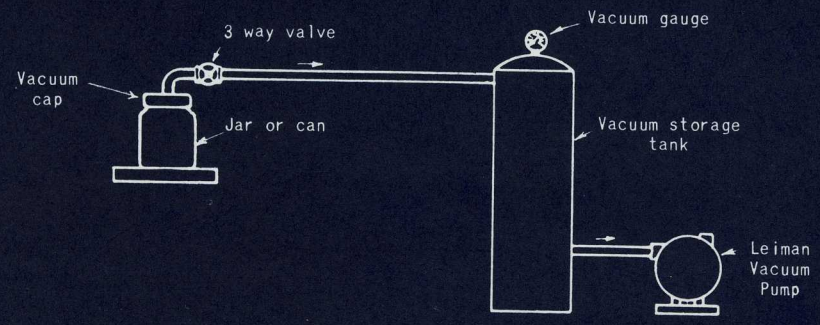
Vacuum	Size Pump
29"	26-1½
29"	28-3

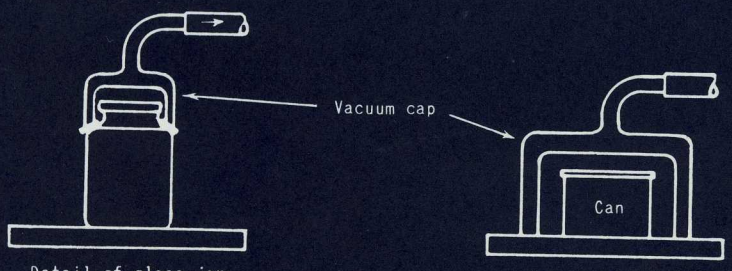
This method is used for extracting air bubbles from various materials and thus making the material more dense.

6291

VACUUM CANNING AND PACKING OF FOODS

7-B





Detail of glass jar with metal cover

Detail of metal can

The vacuum pump maintains a high vacuum in the storage tank ready for instant use.

After the food is placed in the can or jar the cover is laid on top and the vacuum cap is placed on the jar. The three way valve is opened and the vacuum removes all air from the jar. When the 3 way valve is turned open the vacuum is quickly broken and the vacuum in the jar pulls the cover down tight.

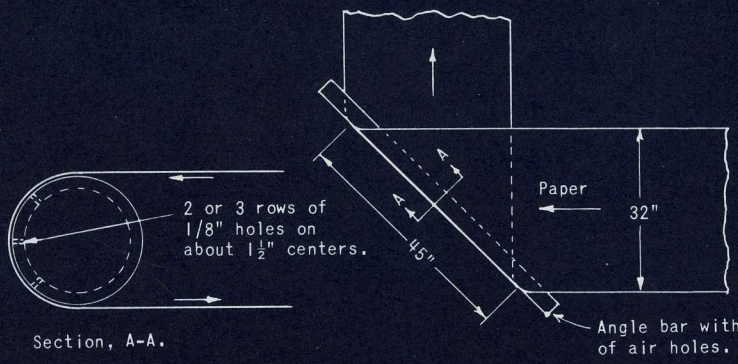
Size Pump	No. of Pint Jars Per Minute	Motor H.P.
28-3	5	1-1/2
29-3	8	2
29-6	16	3

28 to 29" Vacuum

6288

ANGLE BARS FOR PRINTING PRESSES (WEB TYPE)

8-A

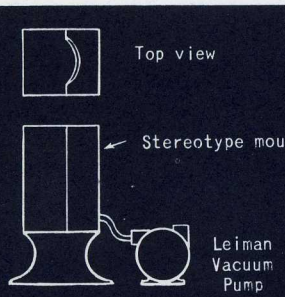


About 5 pounds air pressure prevents the paper from contacting the angle bar and causes it to float over the bar. This prevents smudging of the wet ink.

SOME PRESENT INSTALLATIONS:

Size of Leiman Pump	Width of Paper	Number of Bars
D	32"	2
G	32"	6
G	36"	2
G	36"	4

6223

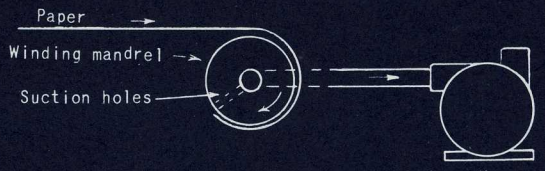


Matrix is held tight against suction holes in mould by vacuum while molten lead is cast.

Use 15" vacuum
Use size C or C-6 or D

STEREOTYPE CASTING

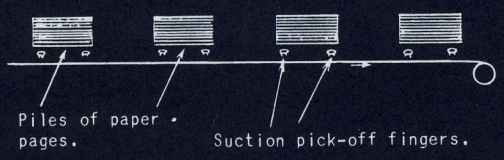
8-B



Use 20" to 28" vacuum

Size Pump	Length of mandrel
28-3	15"
29-3	24"
29-6	48"

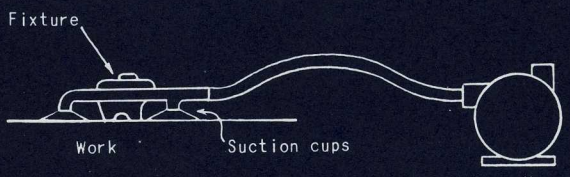
PAPER TUBE MAKING



Different pages are picked off different piles and assembled onto a conveyor to make a book.

Size Pump	Number of Piles
C	4
D	8
E	15

GATHERING MACHINE



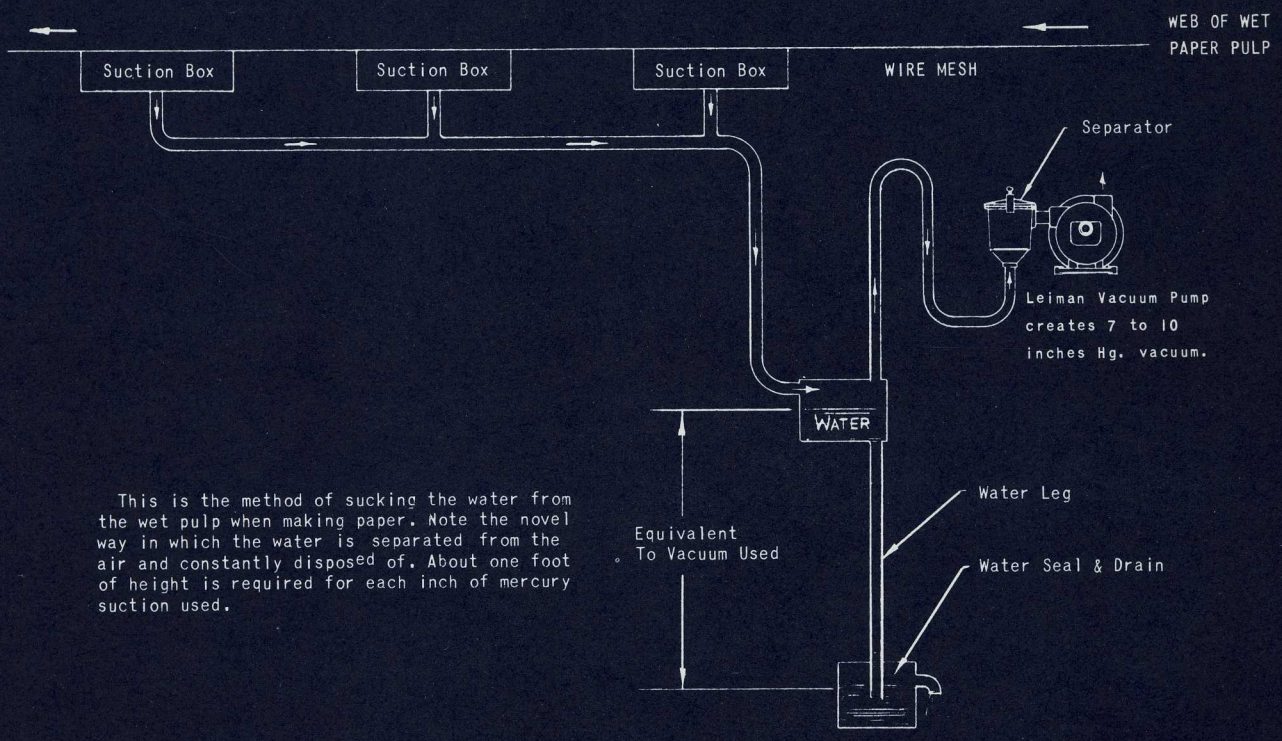
Fixture or jig can be held in contact with work by suction until operation is completed.
Fixture can be quickly moved from spot to spot.
Eliminates clamps, magnets or drilled holes.

FIXTURE HOLDER

6285-A

FOURDRINIER PAPER MACHINE SUCTION BOXES

9-A

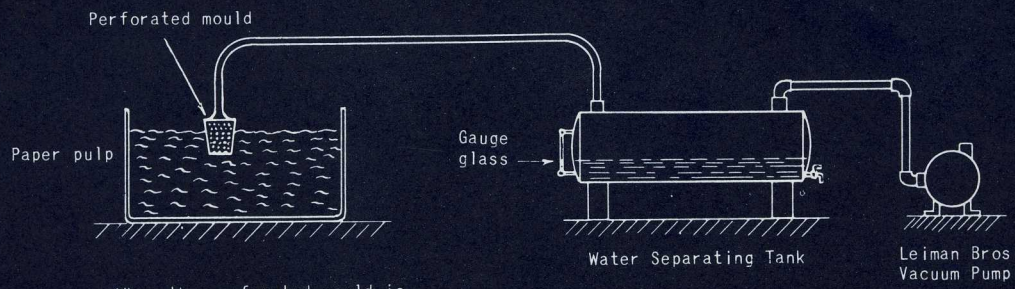


This is the method of sucking the water from the wet pulp when making paper. Note the novel way in which the water is separated from the air and constantly disposed of. About one foot of height is required for each inch of mercury suction used.

6269

VACUUM PAPER MOULDING

9-B

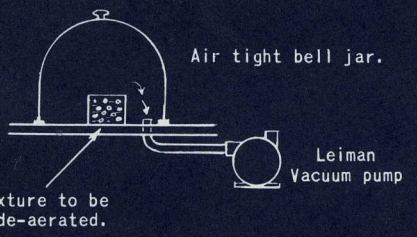


When the perforated mould is dipped into the pulp the water is sucked thru the holes leaving the pulp clinging to the surface of the mould.

This method is used for forming various shaped articles from paper pulp such as pie plates, bowls, cups, etc.

6292

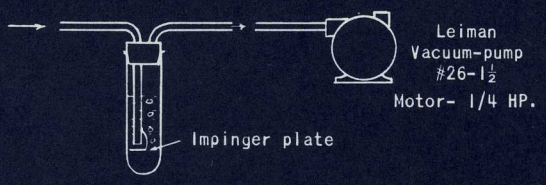
10-A



A high vacuum pulls the air out of wet mixtures such as putty, plaster, etc.

Vacuum	Size Pump
29"	26
29"	28-3

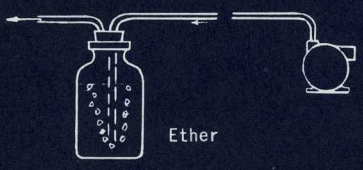
DE-AERATING.



For testing the dust content of air in work rooms the dust laden air is sucked through a water filled test tube and the dust collected on the impinger plate is examined under a microscope.

Full instructions are given by the U.S. Dept. of Health.

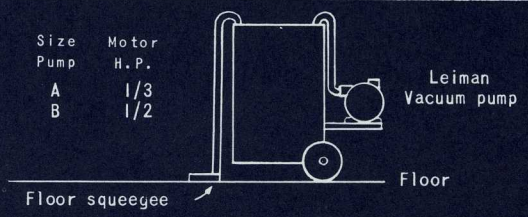
DUST IMPINGER



Size Pump	Motor H.P.
25	1/8
26	1/4

For use in operating rooms. Air is forced to bubble through a jar of ether or other anesthetic and vapor is carried to patient.

ETHERIZING.



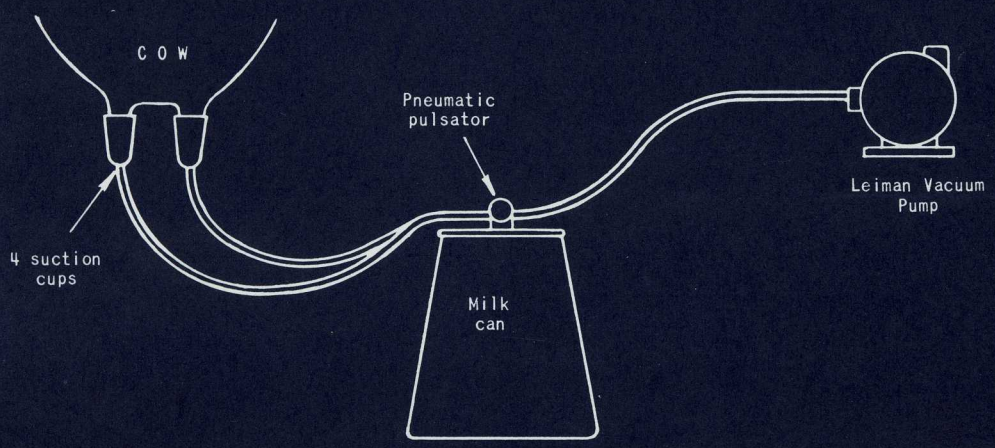
Soapy water from washing of floors is forced in front of rubber squeegee and a suction tube then sucks it up into collection tank as truck is pushed forward.

FLOOR SCRUBBING.

6285

10-B

VACUUM MILKING MACHINE



Two tubes lead to each teat. One tube is for milk and other tube is for air. Vacuum alternates from one tube to the other, producing a natural milking action on each teat.

Allow about 3 cfm. per cow.

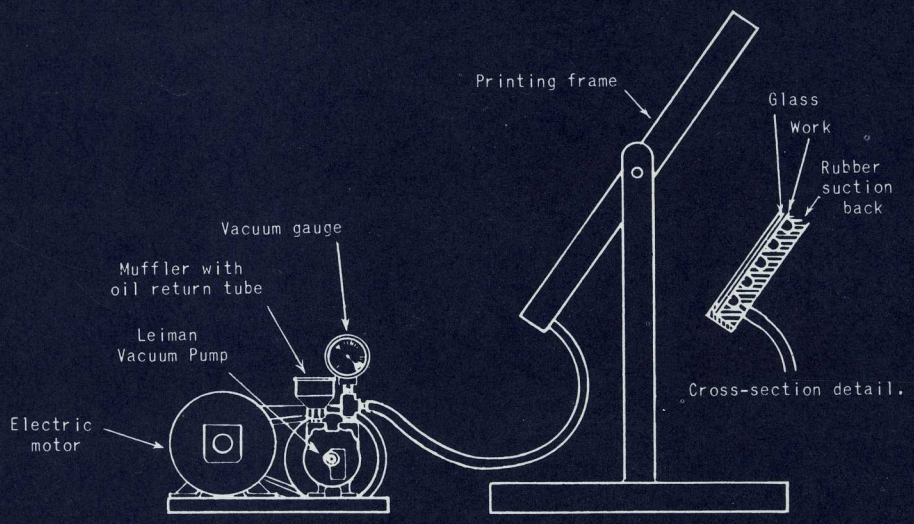
USE 15" VACUUM

Size Pump	No. of Cows	Motor H.P.
26	1	1/4
B	2	1/2
C	4	1
D	8	2

6289

VACUUM PRINTING FRAME

11-A



This pump will produce a very high vacuum (about 27") which will keep the work tight against the glass.

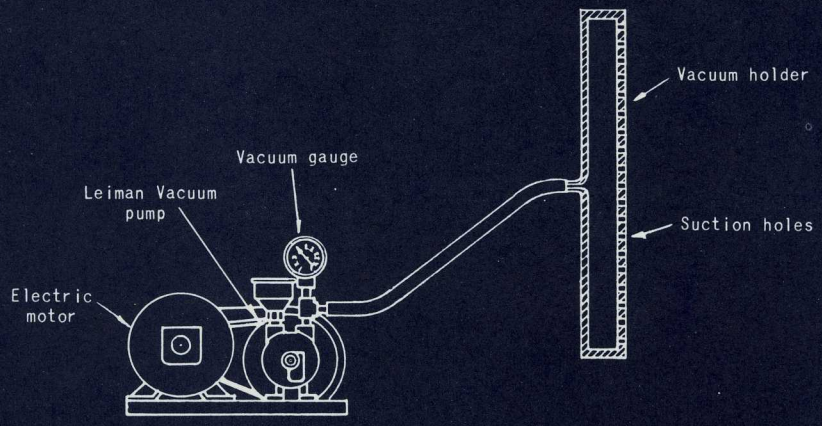
The #26-1½ vacuum pump driven by a 1/3 h.p. motor will take care of any frame up to about 36" x 48". As it will take a few seconds longer to build up a vacuum on the larger size frames, a larger size pump is sometimes used.

Sq. Ft. Area of Frame	Size of Pump	Motor H.P.
12	26-1½	1/4
45	28-3	1

6253

VACUUM CAMERA BACK OR COPY HOLDER BOARD

11-B



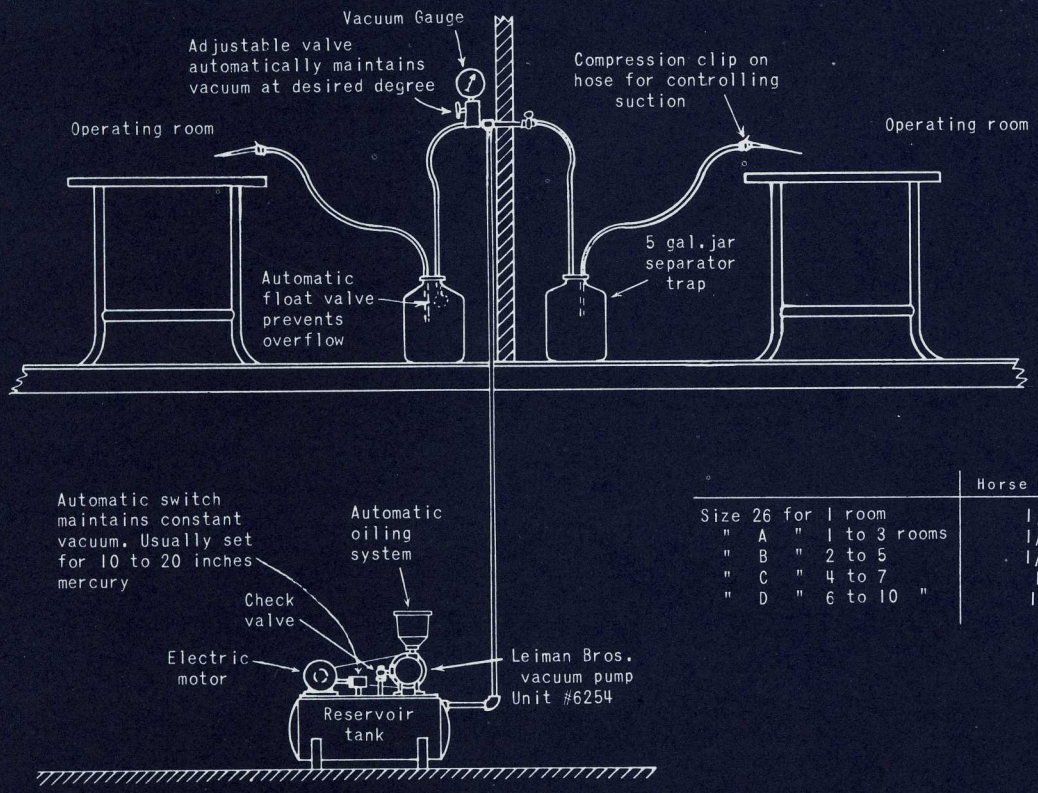
This pump will produce a very high vacuum (about 27") which will keep the work or film tight against the holder board.

Size of Pump	Vacuum	Area of board
B B-3	20"	2½ 4
26-1½ 28-3	27"	1 4

6253-A

VACUUM OUTFIT FOR SURGICAL OPERATING TABLES

12-A

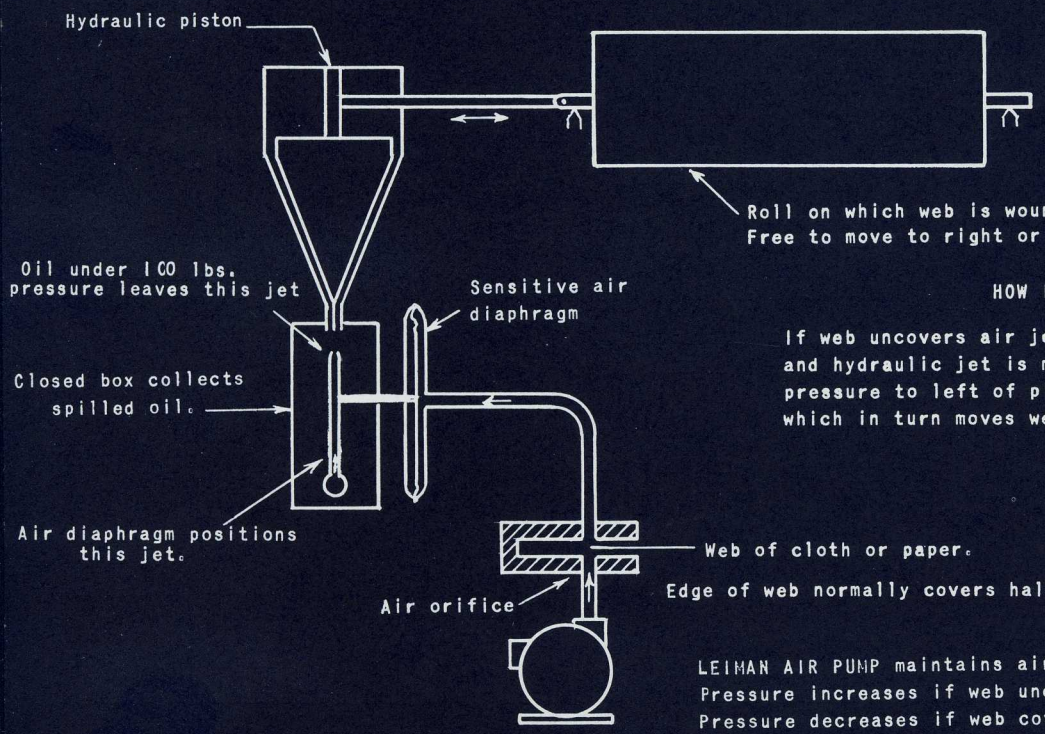


	Horse Power
Size 26 for 1 room	1/4
" A " 1 to 3 rooms	1/2
" B " 2 to 5	1/2
" C " 4 to 7	1
" D " 6 to 10 "	1½

6009-A

GUIDING WEB OF PAPER

12-B



HOW IT WORKS.

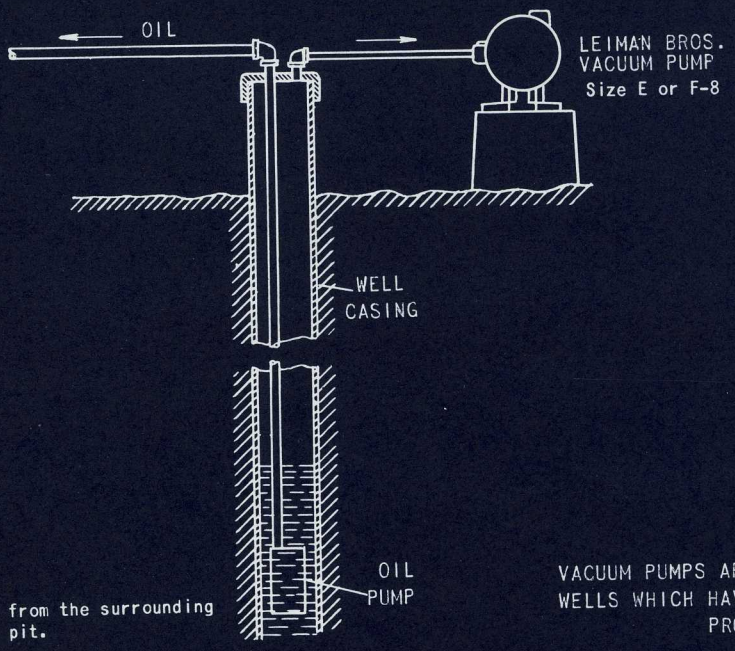
If web uncovers air jet, pressure increases on diaphragm and hydraulic jet is moved to left thus forcing more pressure to left of piston and moving piston to right which in turn moves web roll.

LEIMAN AIR PUMP maintains air pressure on diaphragm.
Pressure increases if web uncovers more of orifice
Pressure decreases if web covers more of orifice.

6292-B

VACUUM PUMP APPLIED TO OIL WELL

13-A



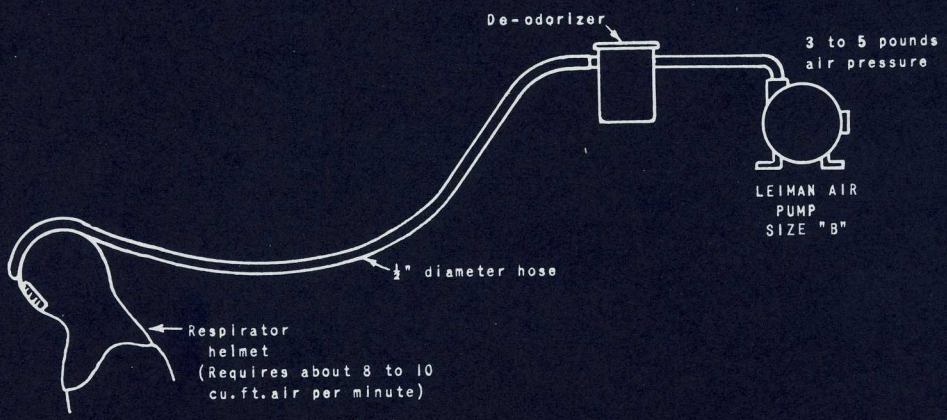
The vacuum sucks oil from the surrounding strata into the well pit.

VACUUM PUMPS ARE APPLIED TO WELLS WHICH HAVE CEASED TO PRODUCE.

1128-C

FRESH AIR FOR RESPIRATOR HELMET

13-B

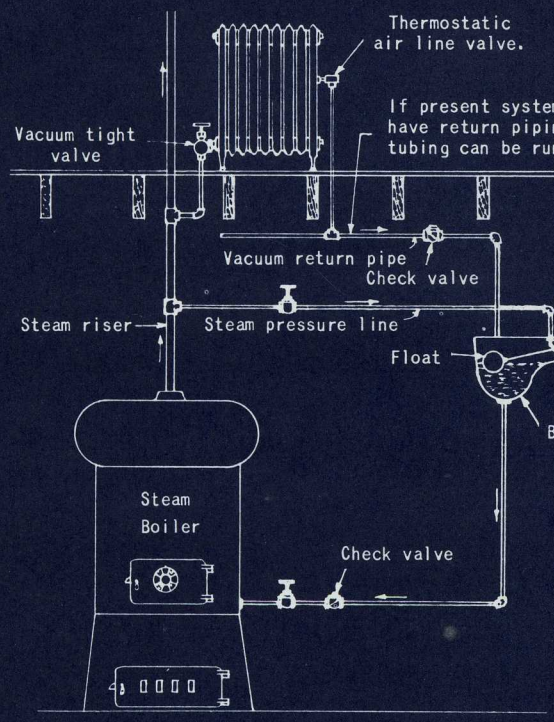


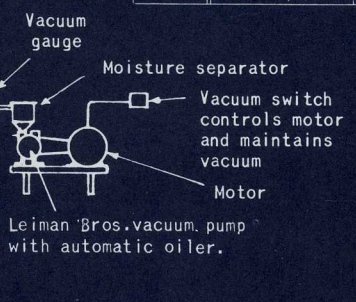
When operators are forced to work in places where the air is full of dust or obnoxious fumes, this type of helmet supplied with fresh air is a necessity.

6296

VACUUM HEATING SYSTEM

14-A





Pump	Sq. Ft. Radiation	Motor H.P.
26	4,500	1/6
A	7,000	1/3
B	12,400	1/2
C	20,000	3/4

A vacuum system insures rapid heating of all radiators.

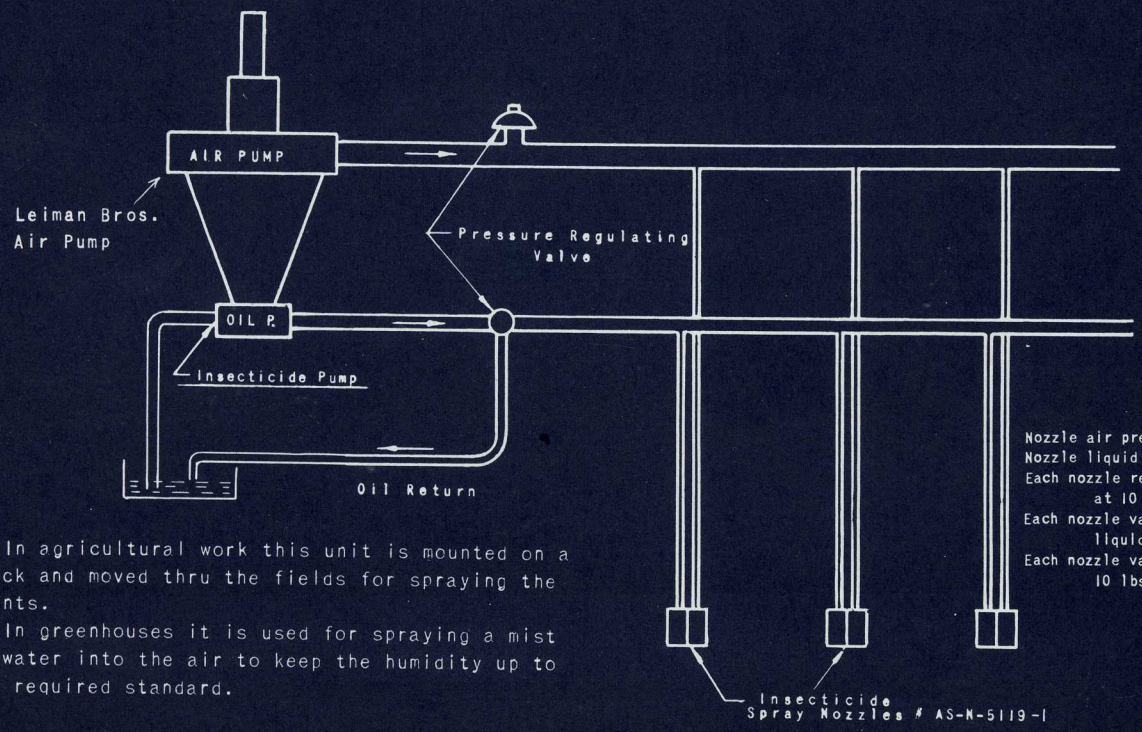
The vacuum pump sucks the cold air out of the pipes and radiators and causes a rapid flow of steam thru the entire system.
It is very important that good thermostatic air valves be used at each radiator so as to prevent escape of steam, otherwise the return trap will fill up quickly and steam will get into the vacuum pump.

Some condensed steam (water) will creep along vacuum line. When a sufficient amount accumulates in boiler return trap, the float will snap the vacuum valve closed and open the steam valve and the water will flow by gravity back to the boiler until the trap is empty.

6245

SPRAYING INSECTICIDE OR WATER, ETC.

14-B



In agricultural work this unit is mounted on a truck and moved thru the fields for spraying the plants.

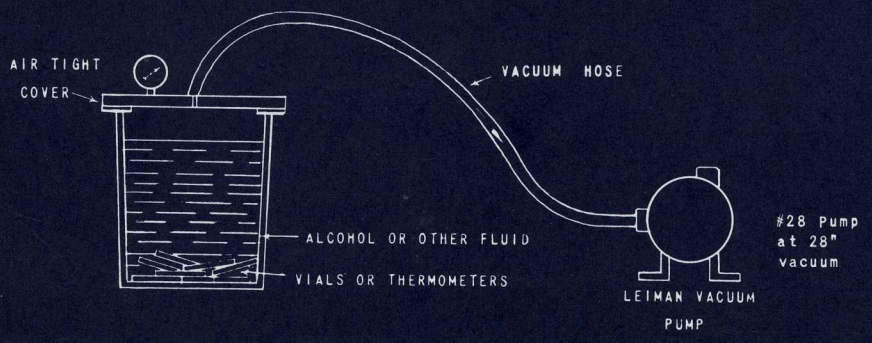
In greenhouses it is used for spraying a mist of water into the air to keep the humidity up to the required standard.

Nozzle air pressure-5 to 10 lbs.
Nozzle liquid press.- 5 lbs. up
Each nozzle requires 1½ cfm. air at 10 lbs. pressure.
Each nozzle vaporizes 1 to 12 gal. liquid per hour.
Each nozzle vaporizes 1½ gph. at 10 lbs. pressure.

5119

FILLING VIALS OR THERMOMETERS, ETC.

15-A

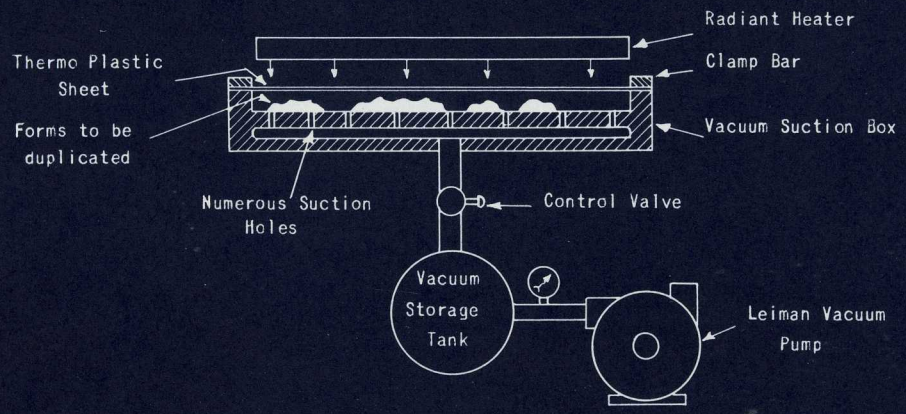


Vials, ampules, thermometers and similar articles having air in them are placed in an air tight crock and submerged in the fluid with which they are to filled. After maximum vacuum is obtained, said vacuum is released and fluid is sucked back into vials, filling them completely.

6297

PLASTIC FORMS BY VACUUM

15-B



Any form or shape can be duplicated by placing it in the vacuum suction box as shown above. A thin sheet of thermo plastic is clamped above the forms and is heated until it softens; then the control valve is opened and the high vacuum acts thru the suction holes and quickly pulls down the plastic sheet over the forms. The process can be repeated many times.

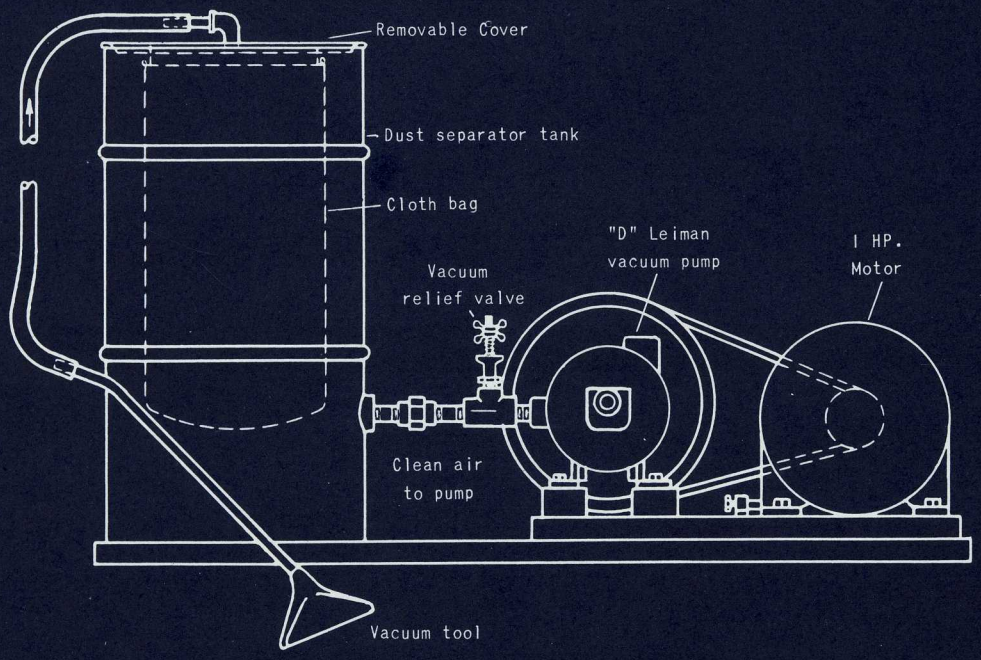
A high vacuum of about 26 to 29" Hg. is maintained in the storage tank by the Leiman vacuum pump.

An 18" x 24" box requires a size 28-3 pump.

6292-A

VACUUM CLEANER UNIT

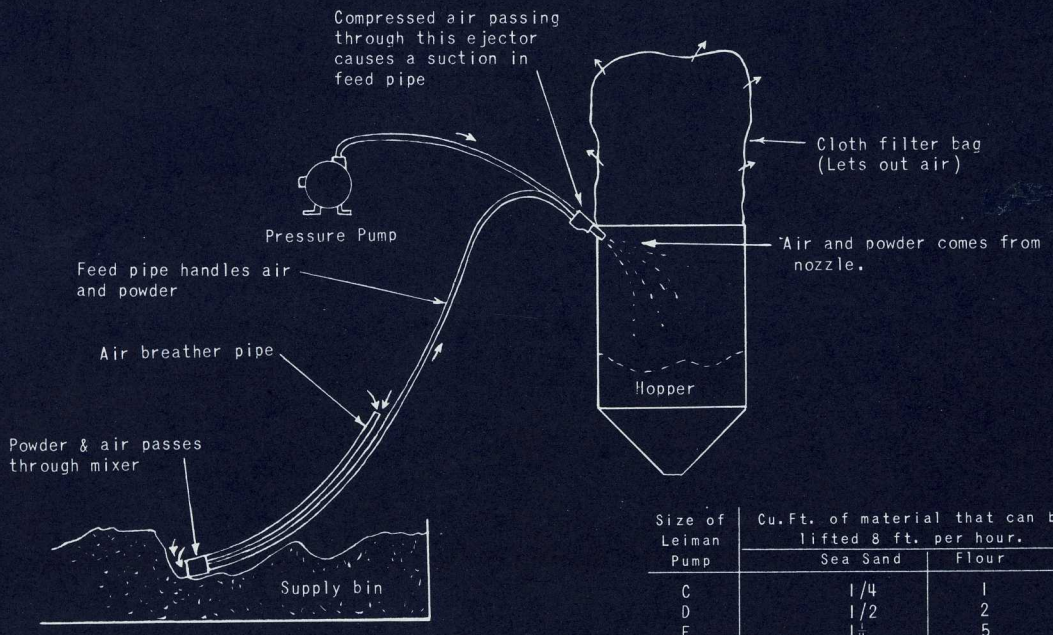
16-A



6174

POWDER CONVEYING

16-B

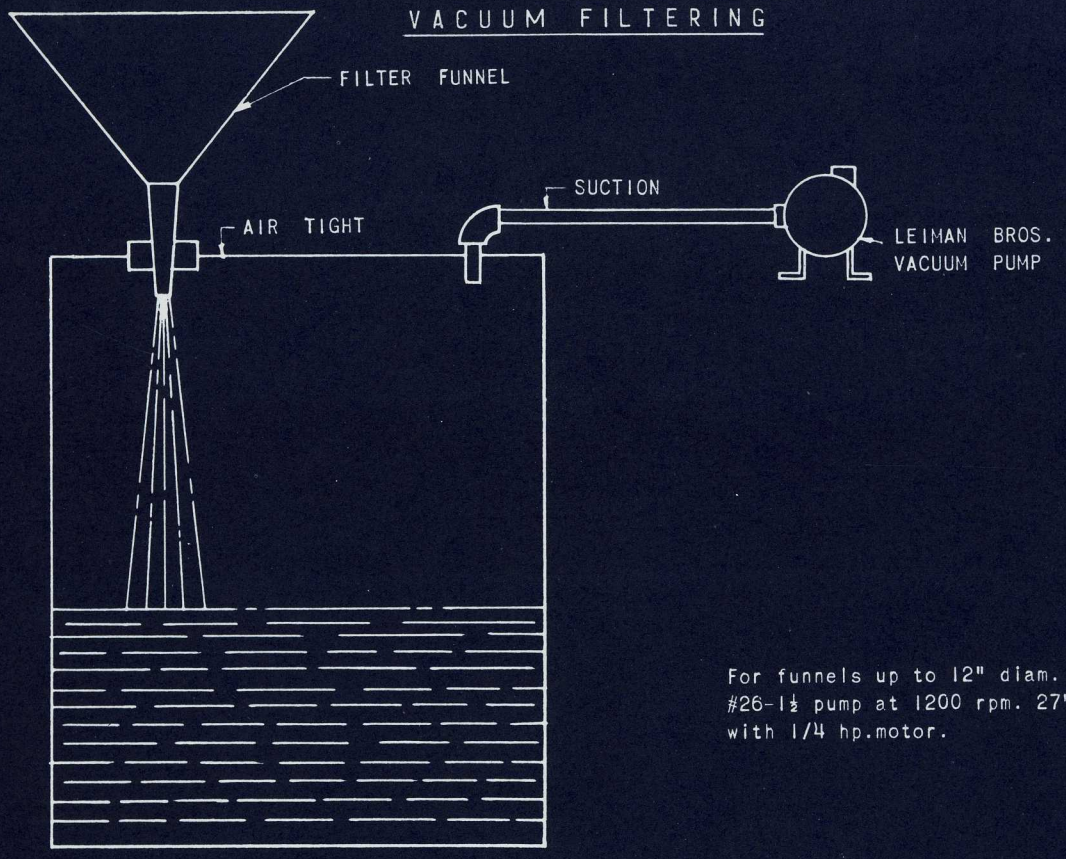


Size of Leiman Pump	Cu.Ft. of material that can be lifted 8 ft. per hour.		Motor H.P.
	Sea Sand	Flour	
C	1/4	1	3/4
D	1/2	2	1
E	1¼	5	2
G	3	12	5

6283

VACUUM FILTERING

17-A



For funnels up to 12" diam. use #26-1½ pump at 1200 rpm. 27" vac. with 1/4 hp.motor.

1128-E

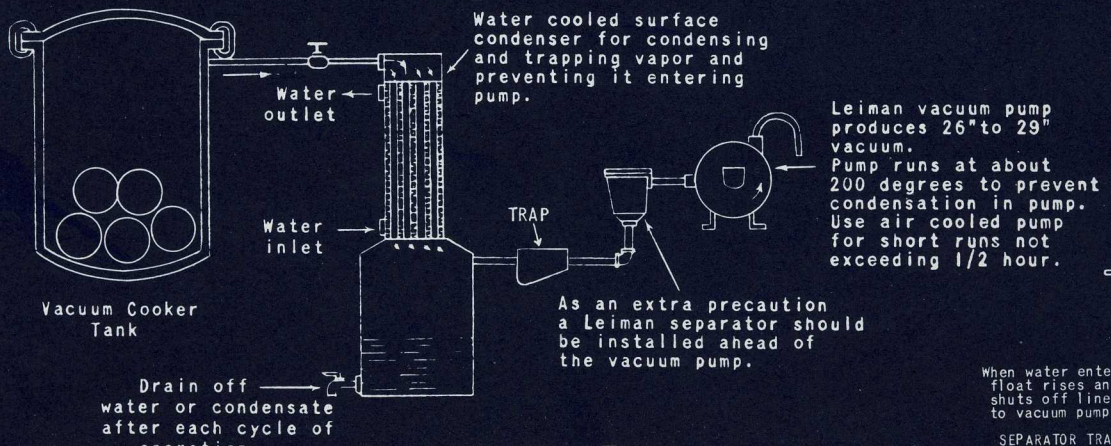
VACUUM COOKER- VACUUM DRYER—VACUUM PAN—DEHYDRATOR

17-B

By holding a vacuum on the cooker, foods can be cooked, wire coils, electric transformers, etc. can be dehydrated at a temperature far below the usual boiling point.
Vapor given off is condensed and trapped in the water cooled condenser and kept from entering dry vacuum pump.

Lbs.of water per hr. to be condensed	Sq.Ft.Condenser Surface	C.F.M. Pump Displacement
5	1	1
10	2	1-2
25	5	2-5
50	10	3-10
100	20	6-20

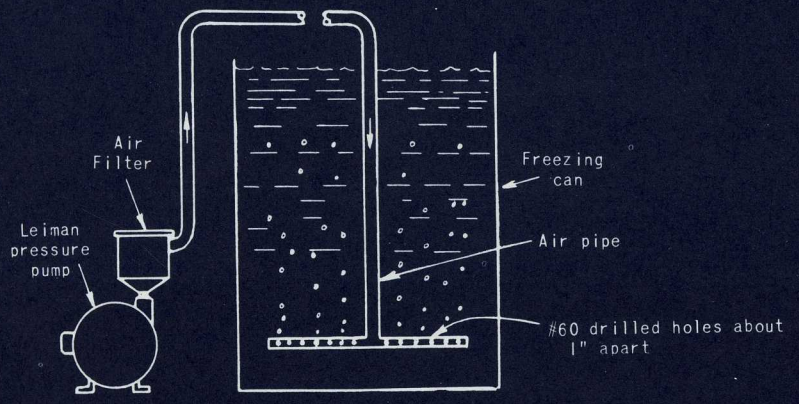
Vacuum chamber volume	Size of Leiman Pump
6 cu. ft.	28-3
20	29-3
30	29-6



6237

AIR AGITATION FOR ICE MAKING

18-A



Air pressure - 2 to 3 lbs.

Volume - 1½ to 2 cu. ft. per minute, per 300 lb. can.

Time required - 2½ to 4 hrs. per freeze.

Note: Air agitation is necessary in the making of clear ice.

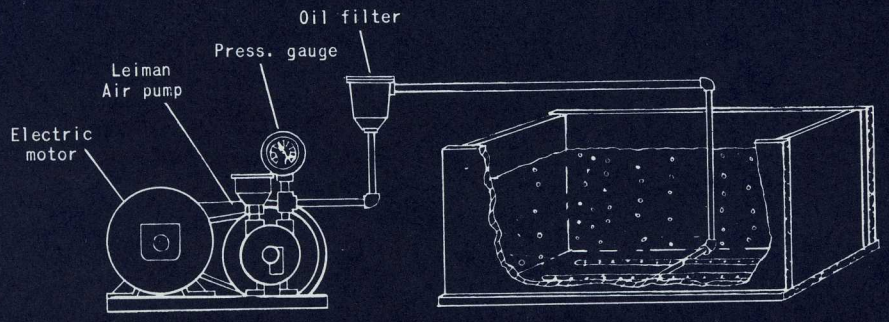
Size of Pump	No. of Cans	H.P.
A	3	1/4
B	4 to 5	1/3
C	7 to 10	1/2
D	12 to 16	3/4
E	30 to 40	1-1/2
F-8	50 to 65	3
G	73 to 98	5

6190

AGITATING CHEMICAL SOLUTIONS, LUBRICATING OILS, ETC.

AERATING AQUARIUMS

18-B



Drilled pipes distribute air bubbles

Depth of water	Air Pressure
1 ft.	1 lb.
2	1½ - 2½
3	2 - 3
4	2½ - 3½
5	3 - 4

Holes should be about #60 drilled size, spaced about 1" apart.

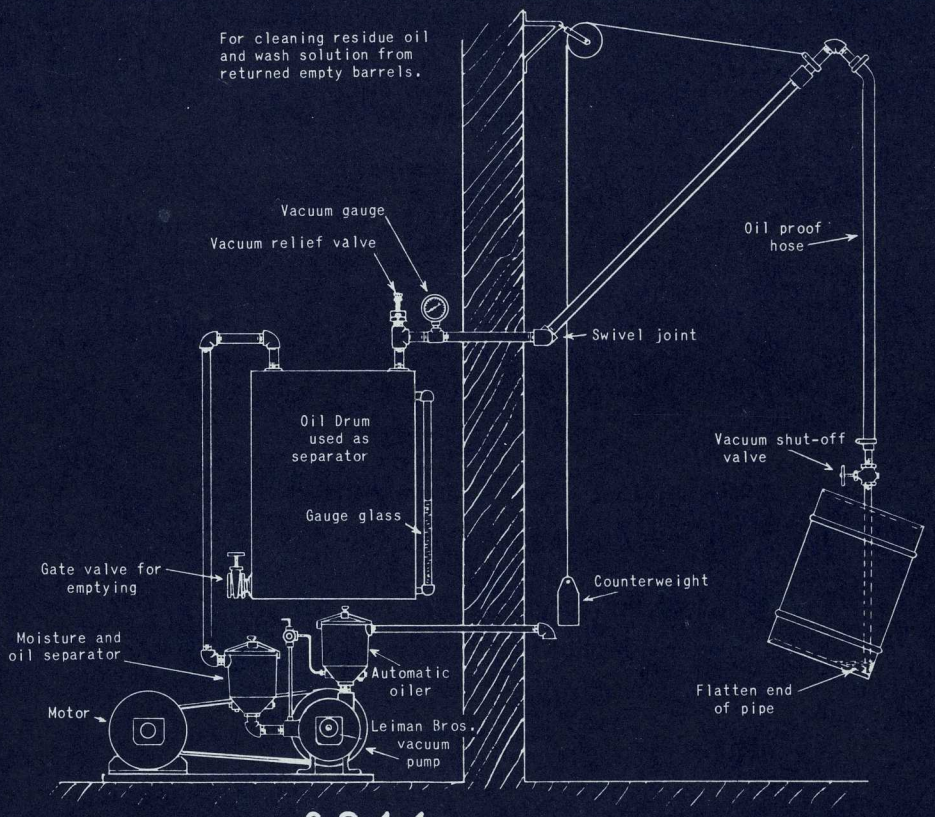
Air pressure required depends upon depth of solution and specific gravity of solution. Two feet of water requires about two pounds air pressure.

Surface area of tank in square feet	Approximate size of pump required.	Motor H.P.
10	# 26-1½	1/6
13	A	1/4
23	B	1/3
41	C	1/2
67	D	3/4
167	E	1½
190	F-8	3

6284

BARREL CLEANING INSTALLATION

19-A



Size of Leiman Pump	Number of Barrel Stations or Operators	Motor H.P.
C	1	1
D	2	1-1/2
E	3-4	3

6244

BARREL CLEANING PROCEDURE

19-B

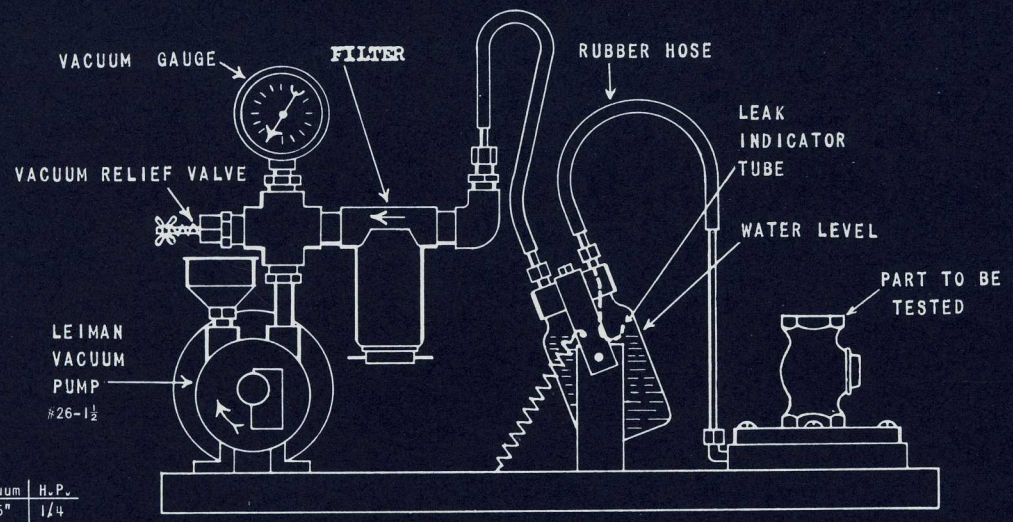
The drawing 6244 shows the usual set-up. The barrel is tipped so that the residue oil runs to one corner and the suction pipe is inserted as shown and the valve is opened. The suction which is usually maintained at about 15" (as read on a mercury gauge) is sufficient to suck up the residue oil and carry it to the large separator. The strength of the suction can be adjusted by means of the vacuum relief valve.

The separator should be watched and should be emptied when it becomes half full. This can be seen in the gauge glass on the side. The smaller separator on the pump is an extra precaution in case any water or oil accidently gets past the large separator. An automatic separator trap could be set in this line to shut off the line and protect the pump in case of accidental overflow.

6244-A

LEAK TESTING MACHINE

20-A



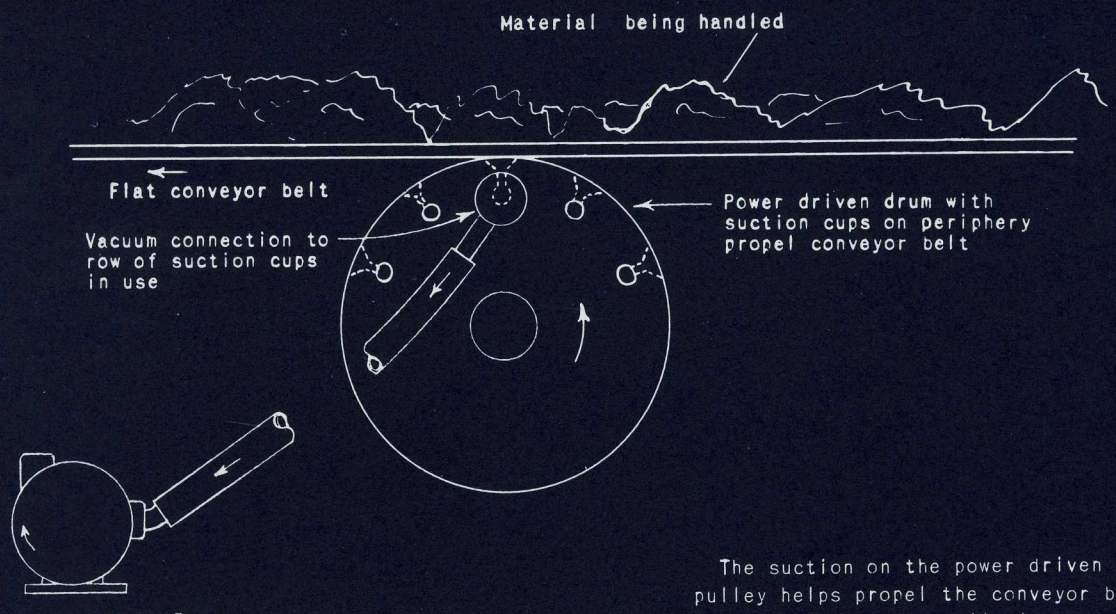
Vacuum	H.P.
15"	1/4
20"	1/4
27"	1/4

To operate, place article to be tested upon rubber pad. Then tip glass jar to right until water covers bent indicator tube. A large number of bubbles indicates a bad leak, a few bubbles indicates a slight leak and no bubbles indicates a tight fitting. Any desired vacuum from 5 to 29" hg. can be used for testing by simply adjusting the vacuum relief valve.

86

VACUUM DRIVER PULLEY FOR CONVEYOR BELT

20-B

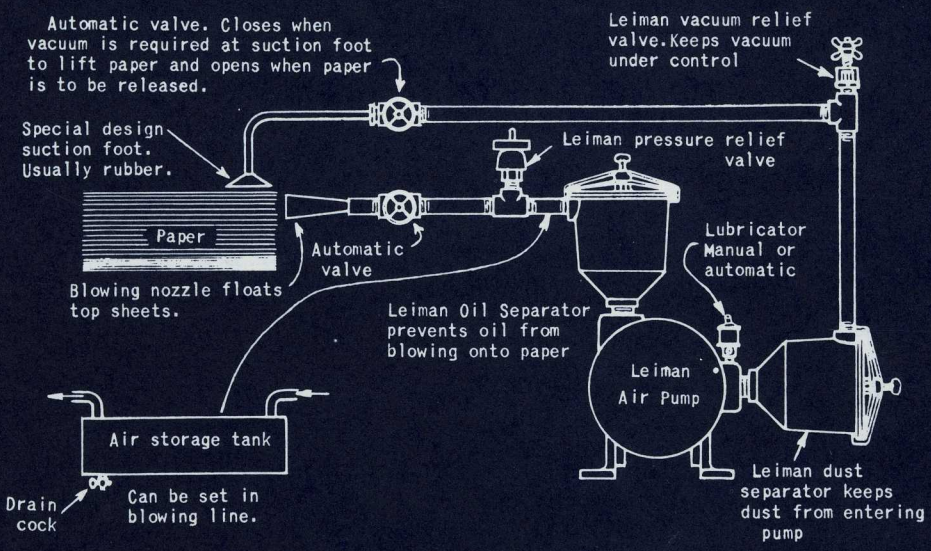


The suction on the power driven drum or pulley helps propel the conveyor belt. On a long belt, say one mile long, a number of pulleys would be required.

6302

PAPER AND SHEET FEEDER

21-A



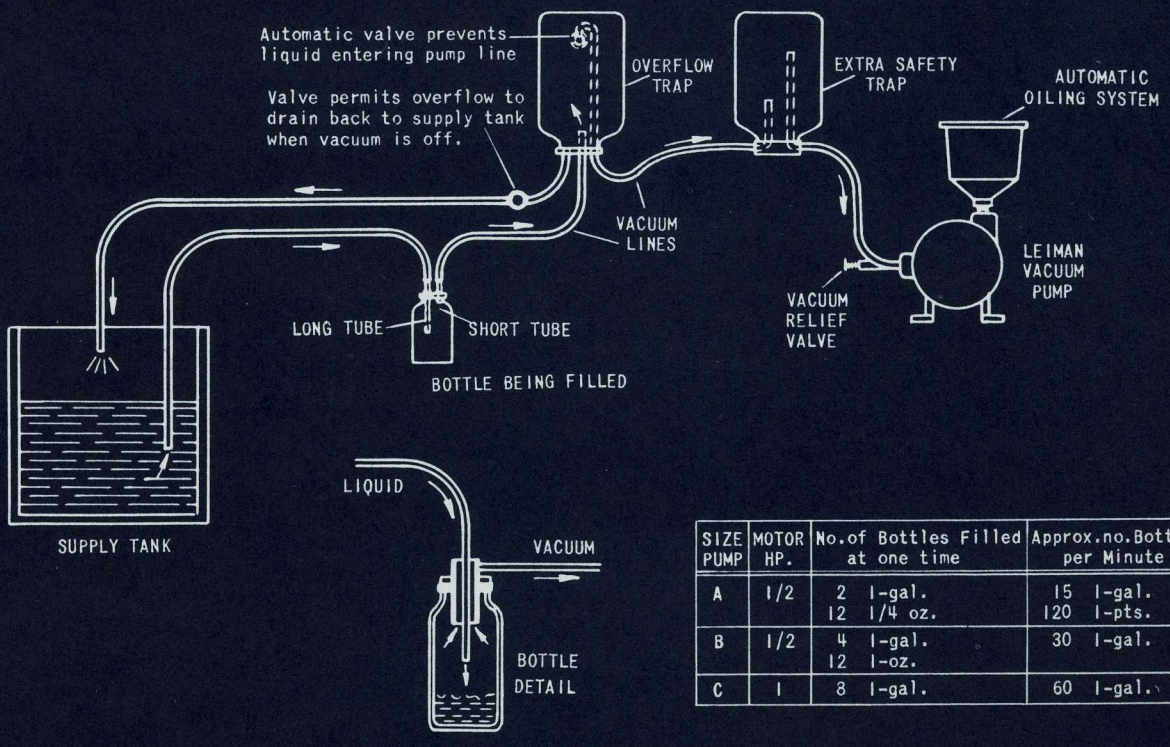
SIZE OF VAC. PUMP	SIZE OF BLOWER	MAX. SIZE OF PAPER
26-1½	26-1½	2" x 2"
A	A	8½ x 11
B	B	25 x25
C	C	22 x 36
C	C-4½	36 x 54
C-4½	C-6	50 x 69

It is best to use 2 pumps, one for suction and one for blowing. About 12 to 15 inches vacuum and 5 pounds pressure is required. A suction of 12" on a one square inch sucker will have a lifting force of 6 pounds.

1111

VACUUM BOTTLE FILLING

21-B

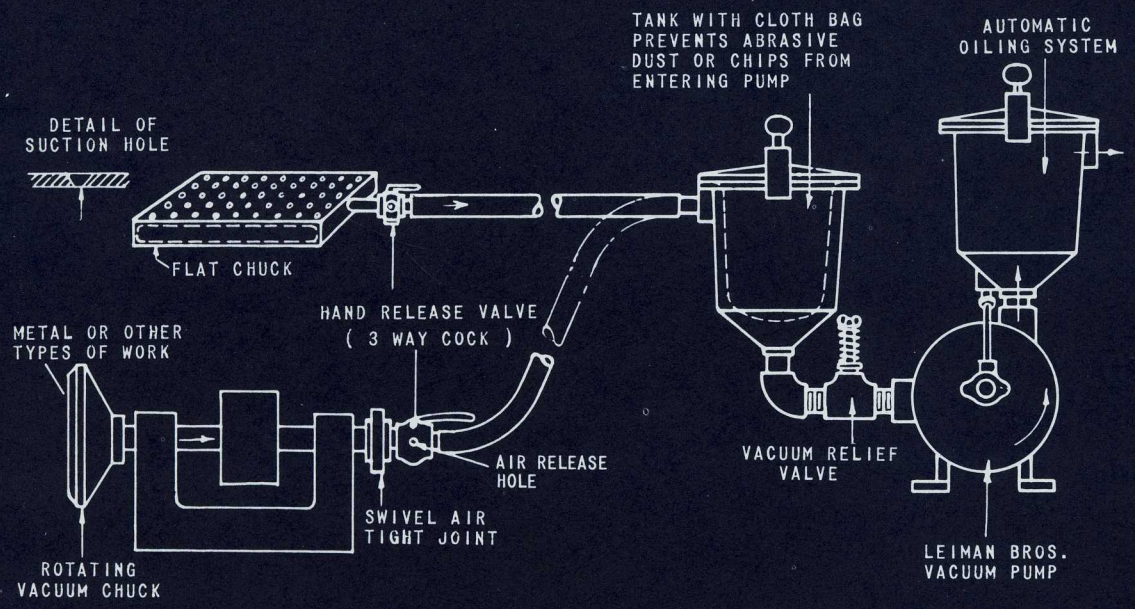


SIZE PUMP	MOTOR HP.	No. of Bottles Filled at one time	Approx. no. Bottles per Minute
A	1/2	2 1-gal. 12 1/4 oz.	15 1-gal. 120 1-pts.
B	1/2	4 1-gal. 12 1-oz.	30 1-gal.
C	1	8 1-gal.	60 1-gal.

6161

VACUUM CHUCKING AND HOLDING

22-A



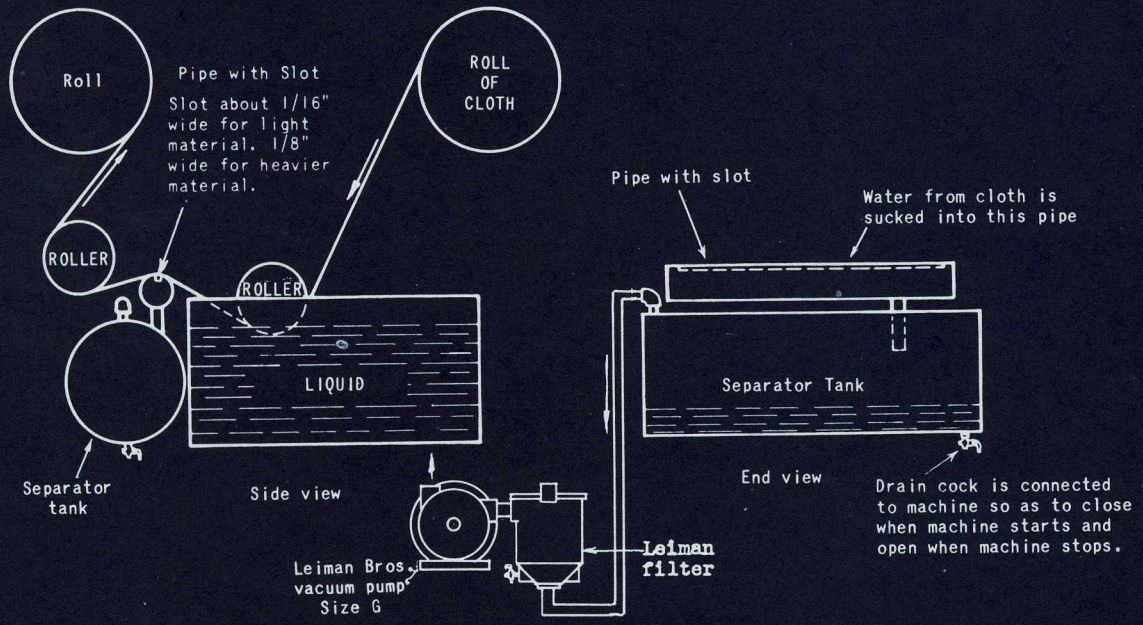
SIZE OF PUMP	DIAM. OF WORK	KIND OF OPER.	VAC.
26	2"	LIGHT GRINDING OR BUFFING	20"
A	3"		20"
B	6"		20"
C	10"		20"
28-3	6"	HEAVY GRINDING LIGHT TURNING	28"
29-3	8"		28"
29-6	10"		28"

20" VACUUM HAS A HOLDING FORCE OF 10 LBS. PER SQ. IN. OF WORK SURFACE

1127

EXTRACTING LIQUID FROM CLOTH

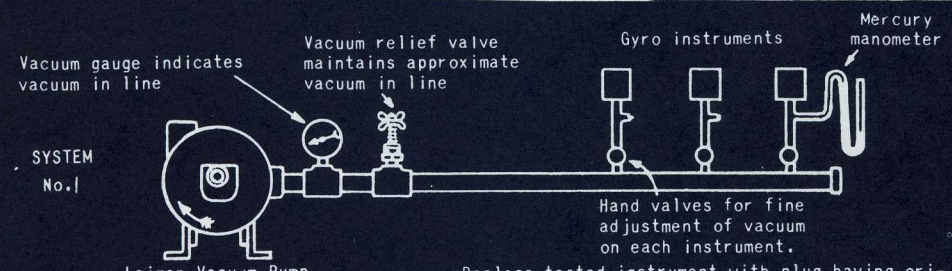
22-B



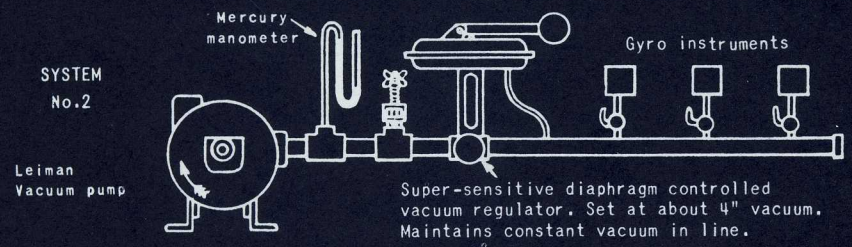
6065

AIRPLANE INSTRUMENT TESTING

23-A



Replace tested instrument with plug having orifice of proper size to maintain proper vacuum.



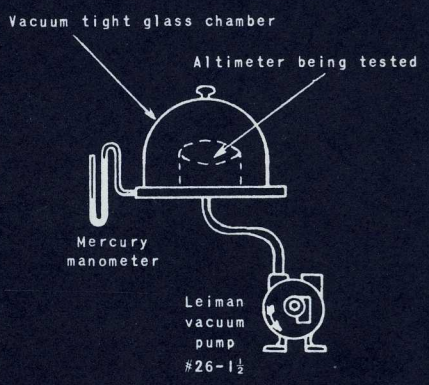
For testing Sperry Directional Gyros, Automatic Pilots and Artificial Horizon instruments with Leiman Bros. vacuum pumps. These instruments obtain their motive power from the turbine or paddle wheel built in them.

Automatic Pilot requires about 5 C.F.M. and other instruments about 2 C.F.M.

About 4 inches mercury vacuum is required.

Size of vacuum pump required	26	A	B	C	D	E
Approximate number of instruments that can be tested at one time.	1	2	4	7	12	28

ALTIMETER TESTING



Degree of Vacuum	Equivalent Altitude In Ft.
10"	10,000
16.3"	20,000
21.1	30,000
24.5	40,000
26.5	50,000
27.79	60,000
28.60	70,000
29.10	80,000

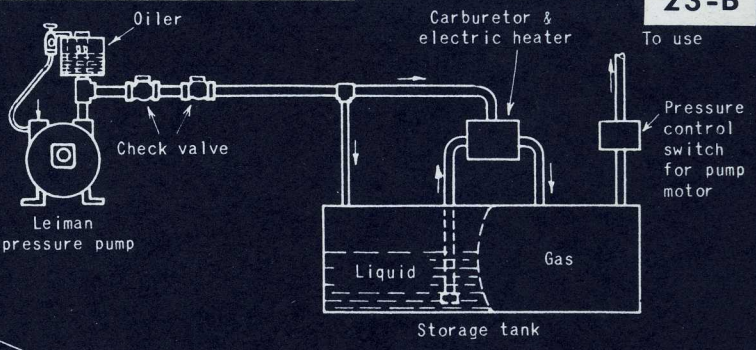
If barometer = 29.92"

6148-F

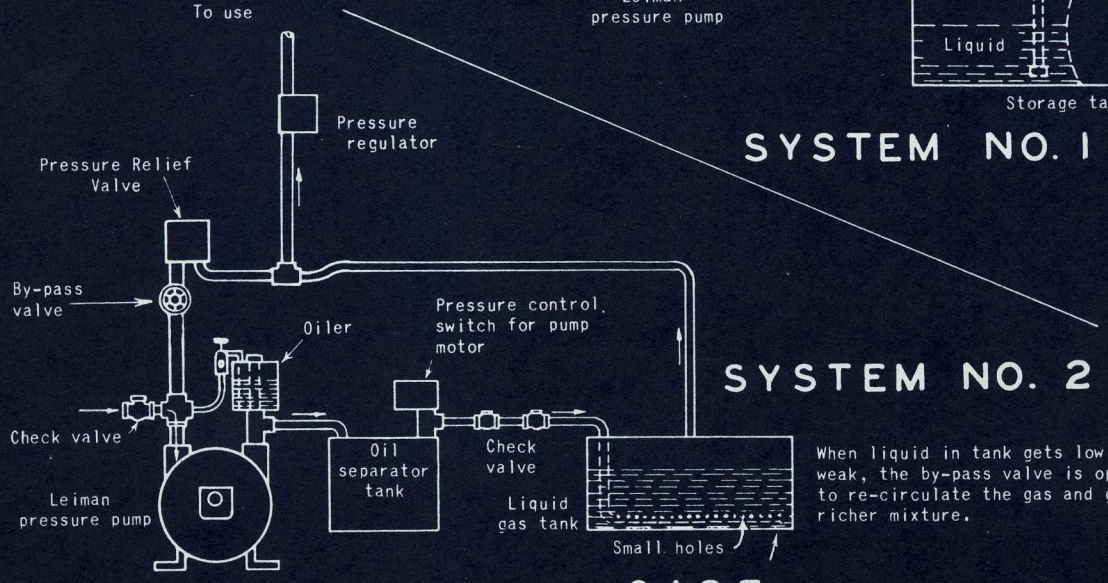
GAS GENERATING SYSTEMS

23-B

For generating gas for cooking from high-test gasoline.



SYSTEM NO. 1

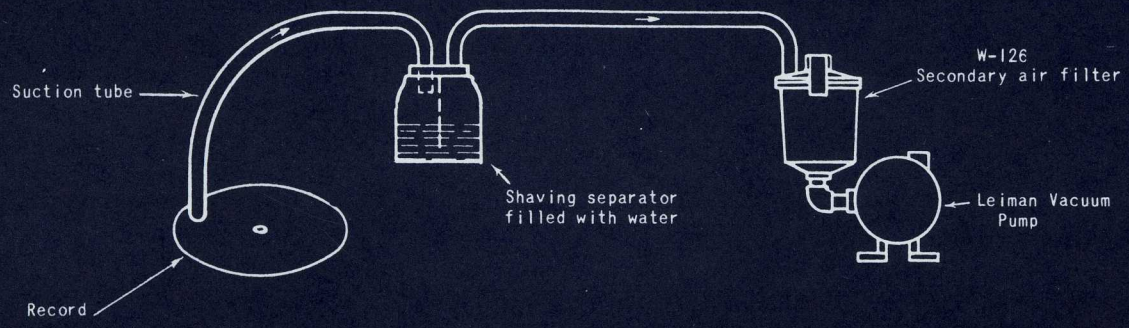


SYSTEM NO. 2

When liquid in tank gets low and weak, the by-pass valve is opened to re-circulate the gas and get a richer mixture.

6137

REMOVING SHAVING WHEN CUTTING PHONOGRAPH RECORDS 24-A



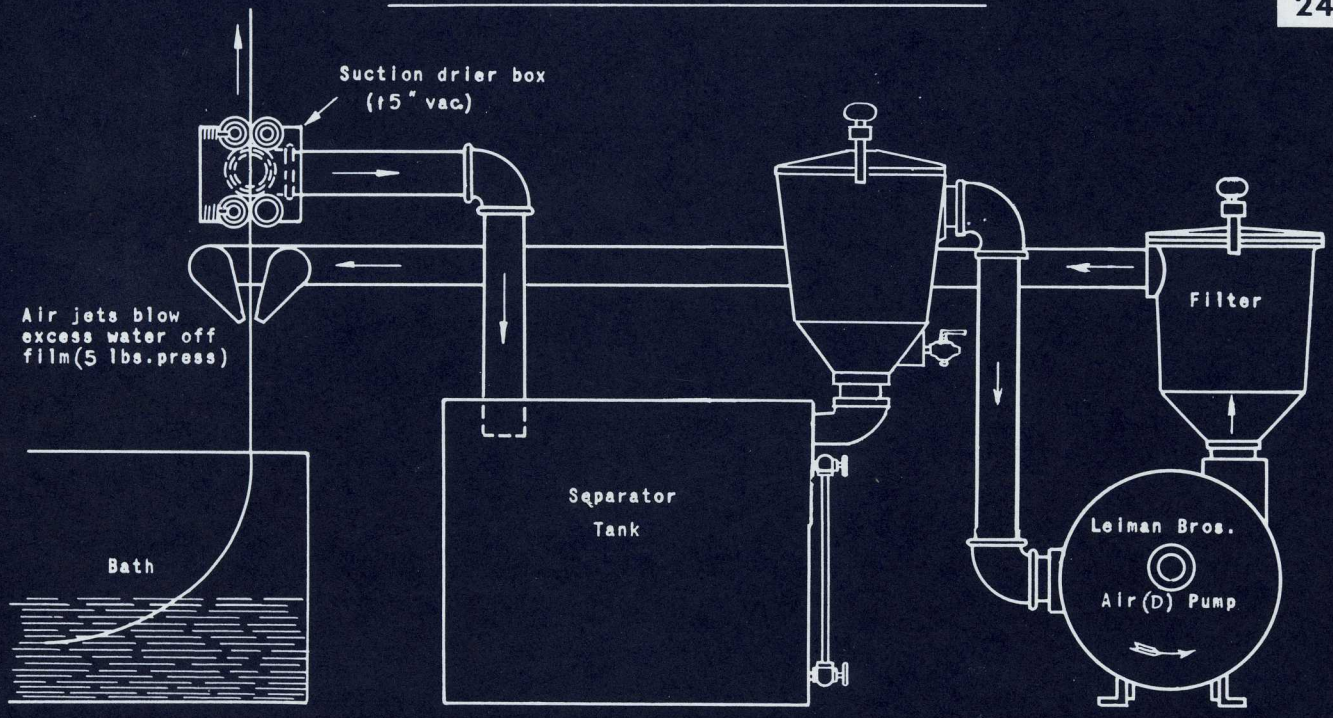
This is a special application for sucking away the long shaving generated when cutting master phonograph records.

Use 12 c.f.m. per cutting machine
Use about 2" to 6" vacuum

Size Pump	No. of Cutting Machines	Motor H.P.
B-3	1	1/2
D	2	3/4
E	5	1-1/2

6290

MOTION PICTURE FILM DRYING 24-B



Either the suction method or the blowing method can be used.
If both methods are to be used, 2 pumps will be required.

6215